

# **FX16 Master Controller**

## **multi-media programmable controller**

The FX16 Master Controller is a multi-media programmable controller of the FX Platform. The FX16 Master Controller is specifically designed for commercial HVAC and refrigeration applications such as chillers and rooftops, indoor packaged air conditioning units, Air Handling Units and Close Control Units.

The controller has 27 physical inputs & outputs and supports a wide range of temperature sensors and actuating devices. Additional physical inputs & outputs may be achieved by adding the XT/XP expansion modules on the Local N2Open bus.

The FX16 Master Controller is able to manage a distributed control application with up to 8 FX Platform slave controllers (FX05 Advanced, FX15 Classic & Universal). Parameters in the distributed control application can be displayed and modified from the optional remote mounted user interface displays.

Multimedia features include the communication services to transmit event notification messages via SMS (Short Messaging Service) or by e-mail. With its on-board Web server, the user can browse and make adjustments to parameters of the application from a remote location.

The FX16 Master Controller is fully programmable, using the FX TOOLS 2 Suite, for a wide range of commercial environmental control applications including the connected XT/XP modules and FX slave controllers.

The FX16 Master Controller is also available with a serial communication card for integration into a Building Automation System with a LonWorks® or N2Open bus network.

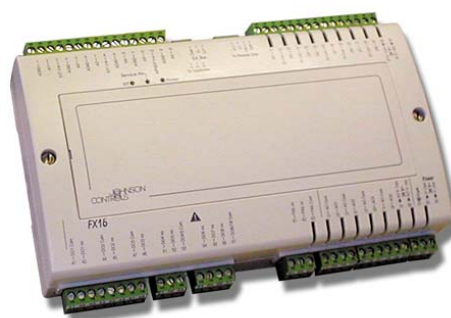


Figure 1 : FX16 Master Controller

| Features and Benefits                                                                                                               |                                                                                                                                                                                    |
|-------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> <b>Distributed Control Application</b>                                                                     | Management of multiple FX Platform controllers operating as an integrated control system with a common user interface                                                              |
| <input type="checkbox"/> <b>Embedded Web server</b>                                                                                 | Data available from the control system on a Web browser with standard Internet Explorer® software V5.5 or later at any location with a secure access to the FX16 Master Controller |
| <input type="checkbox"/> <b>Communication Services</b>                                                                              | Automatic reporting of important events/alarms by e-mail or by SMS (Short Message Service)                                                                                         |
| <input type="checkbox"/> <b>Supervisory Communication Options</b>                                                                   | FX16 Master Controller can be integrated into a supervisory Building Management System using the optional LonWorks® or N2Open communication cards                                  |
| <input type="checkbox"/> <b>Freely Programmable using FX TOOLS 2 Software Suite</b>                                                 | Adaptable to a wide range of HVAC or refrigeration control applications using the extensive programming features of the FX TOOLS 2 software Suite                                  |
| <input type="checkbox"/> <b>Trend and Event Logging</b>                                                                             | Automatic reporting and recording of control system events and alarms as well as continuous trending of data from selected control routines for display or long term storage.      |
| <input type="checkbox"/> <b>Software selectable analog inputs : A99 / NTC k10, 2k2<br/>4-20 mA<br/>0-10 V<br/>0-5 V Ratiometric</b> | Choice of temperature sensor according to the control range and application.                                                                                                       |
| <input type="checkbox"/> <b>User Interfaces, integrated or remote</b>                                                               | Clear data presentation in numerical and text format on LCD 4 x 20 character display to manage the controlled system.                                                              |

## On Board Inputs and Outputs

The FX16 Master Controller features the following I/O Channels:

- ❑ 6 high resolution Analog Inputs;
- ❑ 8 opto-isolated Digital (Binary) Inputs (DI) – for voltage free contacts;
- ❑ 9 Digital Outputs (4 Relays -line voltage contacts- and 5 Relays -line voltage contacts- or 5 Triacs - 24 VAC-);
- ❑ 4 Analog Outputs (0..10 V).

## Scalable I/O Expansions

The input/output capacity of the FX16 Master Controller may be extended by connecting up to four extension modules via the Local N2Open Bus.

An extension module comprises an XT-9100 processor / communications module and one or more XP expansion modules. The expansion modules provide input/output capability for the extension modules.

An extension module set is assembled from sub-modules, providing various combinations of analog and digital (binary) I/O points.

The connectable expansions are:

- ❑ XT-9100 Processor / Communication Module
- ❑ XP-9102 6 universal AIs + 2 AOs
- ❑ XP-9103 8 DOs (triacs)
- ❑ XP-9104 4 DIs + 4 DOs (triacs)
- ❑ XP-9105 8 Dis
- ❑ XP-9106 4 DOs (Relays) 230VAC (Europe only)
- ❑ XP-9107 4 Dos (Relays) 24VAC (North America only)

Refer to the *XT-9100 Technical Bulletin* for more details.

## Embedded Web Server and Web Page Access

The FX16 Master Controller features an embedded Web server that enables a local or remote user to establish communication with the FX16 Master Controller from a PC and to browse live control information, active alarms, recorded data and configuration parameters. This feature provides an effective, low cost monitoring and control system without the need for any special or proprietary supervisory software.

The Web pages are accessed using a direct serial line or telephone modem connection and the point-to-point protocol (PPP) from any PC with Microsoft® Internet Explorer® software that serves as a Web browser.

The FX16 Master Controller provides the formatting data for the requested pages starting with a “Home Page” from which other pages can be requested. Each page may contain graphic images and links to the other pages as well as data windows for the display of live information from the control system.

The active values are transmitted by the embedded Web server in the FX16 Master Controller to the screen of the PC. Typically up to 16 values can be continuously updated in one page and the user may adjust or override values on the screen. Access to the Web pages is protected by a password system to prevent unauthorised viewing of data and control actions.

From the Web browser the user can access the event history log, the list of active alarms in the FX16 Master Controller. The user can also display the contents of the trend log table, and enable or disable trend collection.

In summary, the Web server interface provides the following features from any PC that is directly connected to the FX16 Master Controller or with access to the telephone system.

- ❑ Display live variables in the monitored control system
- ❑ Adjust and command variables in the control system
- ❑ Display and acknowledge active alarms
- ❑ Display the event history log
- ❑ Display trended values and copy/paste to Excel spreadsheet for storage and further processing
- ❑ Enable and disable trend logs
- ❑ Read and modify communication parameters including e-mail addresses, telephone numbers, etc.

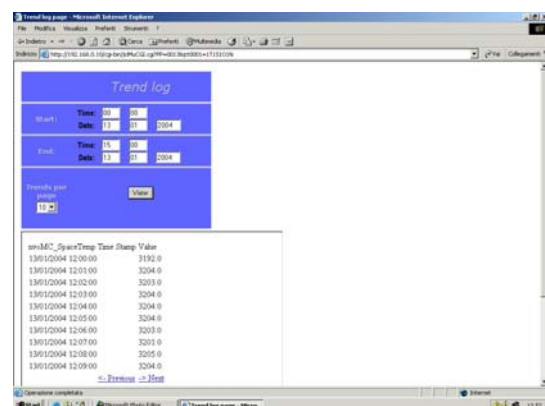


Figure 2 : Web Page with Trend Data

# Communication services

## E-mail, SMS Messaging

The FX16 Master Controller can be programmed to send out e-mail, SMS (Short Message Service) messages when connected to a modem and telephone line or to a GSM (Global System for Mobile communications) modem with an appropriate transmitter and antenna. E-mail messages are directed to an ISP (Internet Service Provider) that offers an e-mail forwarding service. SMS messages can be sent to a Service Centre or directly to a mobile telephone. Messages are sent when an event goes

into the active or alarm state and can be directed to a prioritized list of destinations.

Alternatively if the user has access to a PC with Web browser and modem connection, the control system can be viewed on the Web pages that have been generated in the FX16 Master Controller.

The e-mail service can also be used to periodically send trend log data to a remote e-mail receiver for electronic storage and to prevent the loss of data in the FX16 Master Controller when the trend buffer is full.

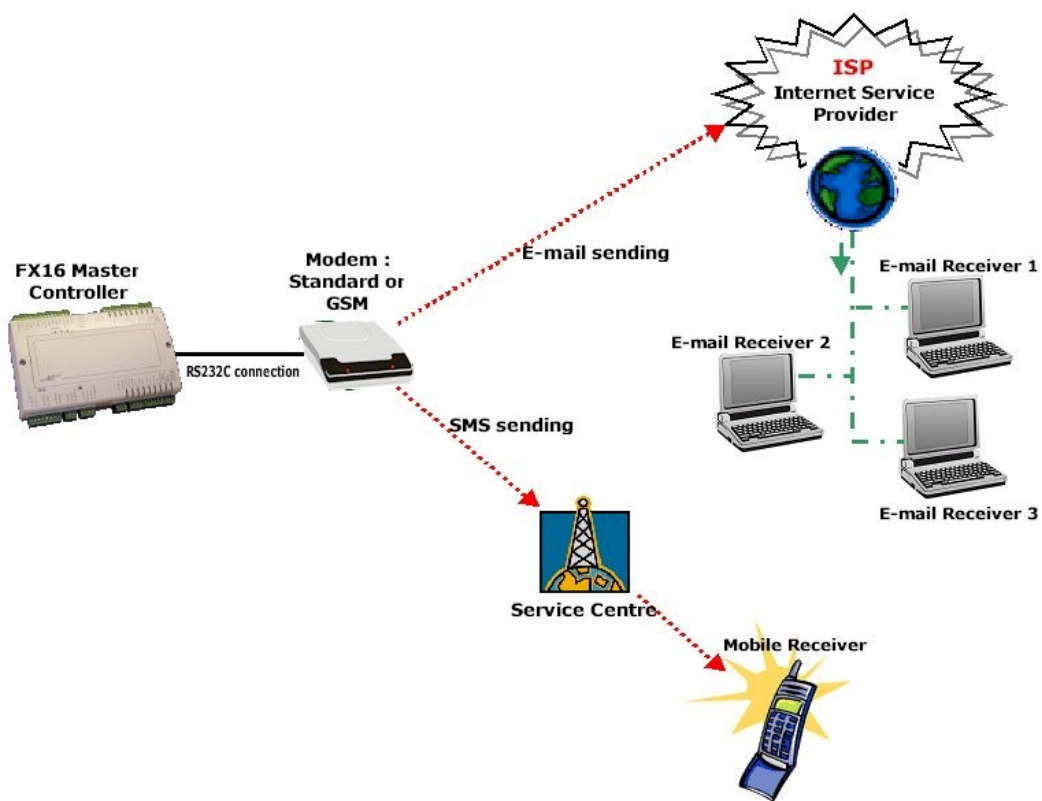


Figure 3 : Communication Services

## Distributed Application

A distributed application is a control strategy that is managed by the FX16 Master Controller but is executed concurrently in the FX16 Master Controller and in up to eight FX platform controllers connected to the Local Link Bus. The communication between the controllers is defined by network variables in the distributed application and the FX16 Master Controller executes the communication in the most effective way to maintain the performance of the entire control system.

Distributed applications are used for the coordinated control of a central plant and the remote equipment that it serves. For example, a distributed application could be applied to an FX16 Master Controller controlling an air handling unit and a number of FX05 controllers controlling zone temperature controllers. Another benefit of the distributed application is the ability to combine FX controllers to provide the required inputs and outputs for the physical equipment interface and then to develop an application that is automatically distributed and executed in the individual controllers as a single control system.

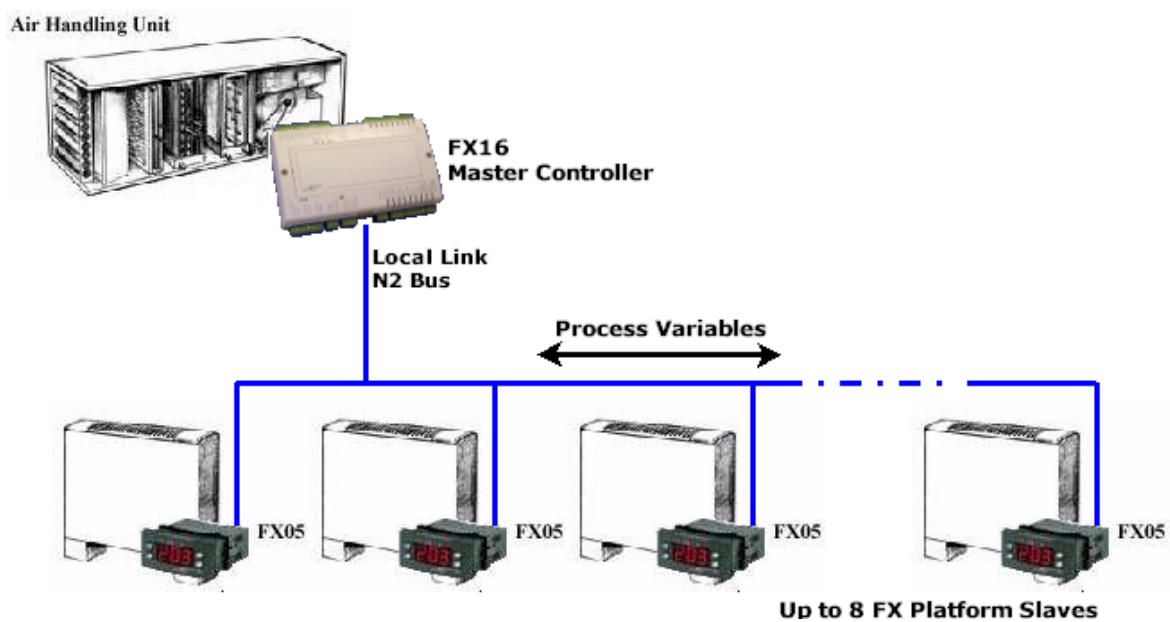


Figure 4 : Distributed Application

# Supervisory Options

The FX16 Master Controller controllers can be integrated into a supervisory building management system for continuous monitoring of the control system. The FX16 Master Controller supports two methods of integration :

## N2Open Network

A supervisory N2Open building management system can be connected to the FX16 Master Controller and has access to all the control system variables and parameters when the FX16 Master Controller is fitted with the N2Open communication card.

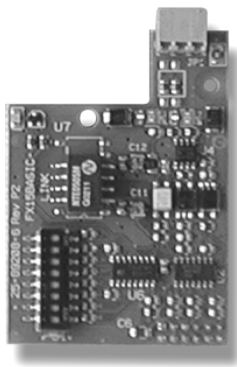


Figure 5 : N2Open Communication card

## LonWorks® Network

A LonWorks® compatible building management system can be connected to the FX16 Master Controller when the FX16 Master Controller is fitted with the LonWorks® communication card.

The LonWorks® network uses the peer-to-peer LonTalk® protocol so that the FX16 Master Controller can be monitored or commanded by any LonWorks® compatible device on the system network and present the data on its user interfaces (integral or remote).

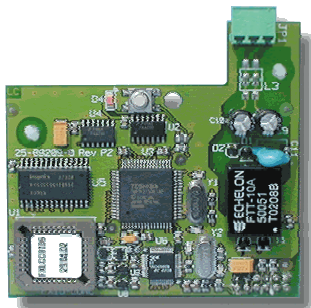


Figure 6 : LonWorks® Communication card

# Real Time Clock

The FX16 Master Controller has a real time clock that supports all real time functions including the display of

time and date on the screen and the time stamping of each event. The real time clock also enables the time scheduling of start and stop commands and set point changes to the plant that is being monitored and controlled. Scheduled commands may be configured to execute on one or more days of the week and an exception day calendar allows for alternative time schedules on holidays or during special periods in the year.

Time schedules may be displayed and edited on the available User Interfaces or in a Web page on a Web browser screen. The real time clock is battery backed with an average battery life of more than two years.

# Alarm and Event Management

The FX16 Master Controller manages and records events or errors that are generated by the operating system and events or alarms that are associated with data points or variables in the control application.

System events indicate to the user that the control system requires some attention and include events such as:

- ☐ System power up
- ☐ Trend buffer full
- ☐ Communication message failure (E-mail, SMS)
- ☐ Device communication error
- ☐ Application or display diagnostic error

Application events or alarms indicate to the user that the controlled equipment requires attention or that the controlled conditions are not within the expected limits.

- ☐ Analog value is outside of a desired range
- ☐ Status value represents a condition that is not normal

When an event goes into the active state, it is entered into the table of active events and the event history log with the time and date of occurrence, and a message window appears on the display screen. The event can also be configured to send a message to one or more of the following:

- ☐ E-mail Message Server
- ☐ Mobile Telephone with Short Message Service (SMS)

When active events are configured to be acknowledged by a user, they are only removed from the table of active events when acknowledged and they have returned to the inactive or normal state. Events may be acknowledged from the available User Interfaces. The table of active events and the event history log may be viewed on the available User Interfaces or Web browser screen.

## Data Trend Logging

The FX16 Master Controller can be configured to record data samples at a defined interval from up to 16 variables within the control application. The sample interval is defined for each variable and can be set from every minute to once per day. The on-board memory can hold, for example, a trend log of samples taken at 15 minute intervals for up to 20 days.

The trend data for each variable can be viewed in text format on the available User Interfaces within a specified time range.

The trend log buffer can also be viewed from a Web browser and the trend information can be copied and pasted into a spreadsheet application such as Excel for further processing and electronic storage. The trend logs can also be transmitted at regular intervals from one hour to every day via the telephone modem connection to an e-mail server. A system event message is generated if the trend buffer is not configured in the circular recording mode and the buffer becomes full.

## User Interfaces, Keyboard and Indicators

The FX16 Master Controller allows for two types of user interface: Local or Remote.

- ❑ **LOCAL:** up to 3 m (10ft) from the controller, power supply and data communication via the flat telephone cable included in the LP-KIT007-000C.
- ❑ **REMOTE:** up to 300 mt (1000ft) from the controller.  
The display must be independently powered. The data communication requires a 3 core shielded cable (not provided) connected to the Remote Display Connection of the FX16 Master Controller.

For more details about the connection possibilities please refer to the specific user interface technical bulletin.

The user interface models connectable to the FX16 Master Controller are:

- ❑ **LP-DIS65P00-0C: Large User Interface Version 2**, panel, flush mount or hand held, 4x20 character backlit LCD, IP54, extended temperature range: -20°C (68°F) to +50°C (122°F), standard JCI front-plate. The front-plate is fully customisable upon minimum order.



Figure 7 : LUI V.2

- ❑ **LP-DIS60P10-0C / LP-DIS60P11-0C: Medium User Interface Version 2**, 4x20 character backlit LCD, IP54, extended temperature range: -20°C (68°F) to +50°C (122°F). Panel mount, non-isolated version, wall mount isolated version.

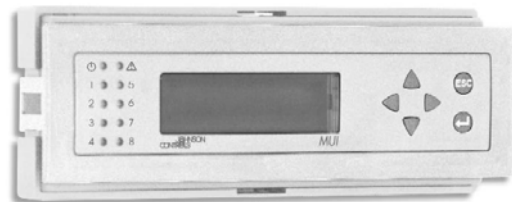


Figure 8 : MUI V.2

## Multi-language database

All the text on the available User Interfaces is fully programmable and can be entered in up to **five** different languages using the table provided in the programming tool that lists all the texts for translation.

The user is then able to select the preferred language from the display menu when logging into the system. This feature has been designed for equipment manufacturers who export systems to many countries in the world or for systems in areas where more than one language is spoken.

## FX TOOLS 2 Suite



The FX16 Master Controller is fully programmable. The FX Builder configuration tool is used to program the controller with the required application, using the 27 physical input/output points. The application can be downloaded, tested and commissioned using FX Loader and FX CommPro software packages.

## Application Upload / Download

The FX16 Master Controller is a fully programmable controller and the application can be downloaded to the controller via PC, with the FX TOOLS 2 or uploaded / downloaded via the FX programming key.

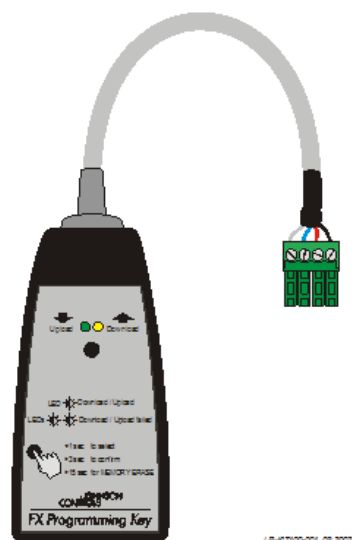
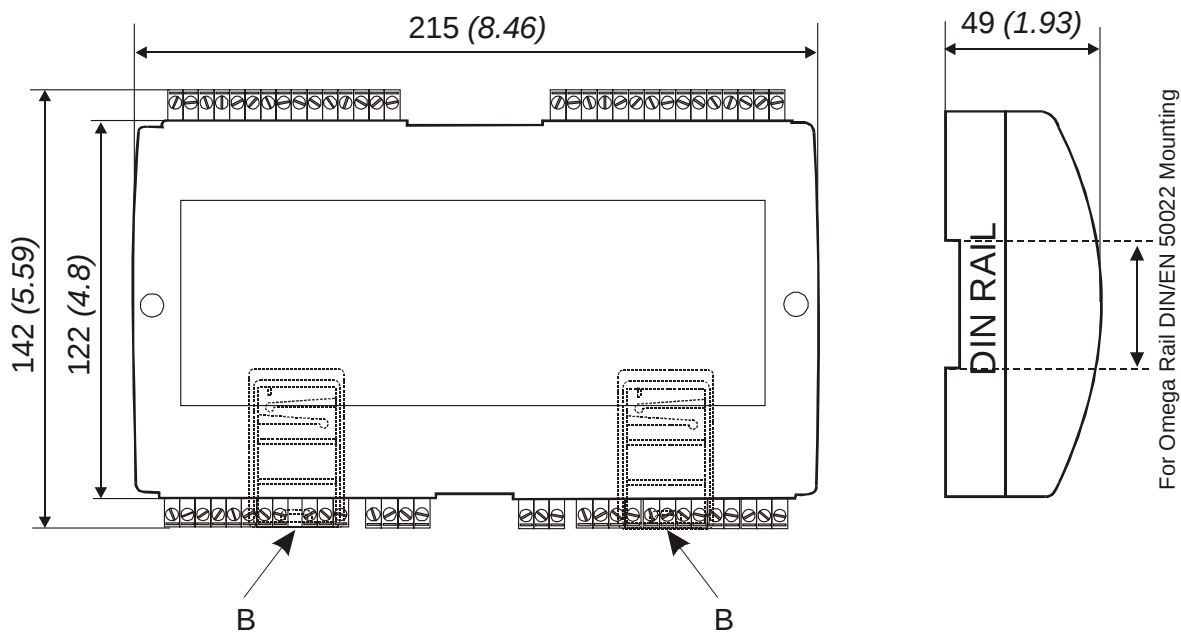


Figure 9 : FX Programming Key

**Dimensions** in mm (inch)



FX16-003\_09 2003

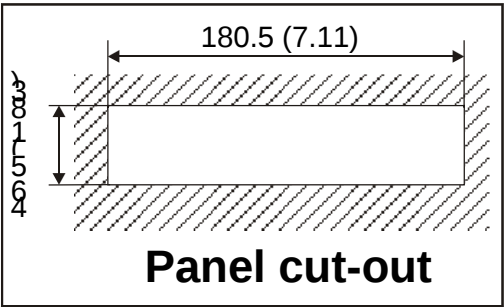


Figure 10 : FX16 Master Controller dimension and cut-out

## Ordering Codes

| Controller                                                                                  | Ordering Codes  |
|---------------------------------------------------------------------------------------------|-----------------|
| FX16 Master Controller, 9 relays, application-less                                          | LP-FX16D00-000C |
| FX16 Master Controller, 9 relays, application-less, N2Open card pre-assembled               | LP-FX16D01-000C |
| FX16 Master Controller, 9 relays, application-less, LonWorks® card pre-assembled            | LP-FX16D02-000C |
| FX16 Master Controller, 9 relays, application-less, RS-232 card pre-assembled               | LP-FX16D03-000C |
| FX16 Master Controller, 4 relays + 5 triacs, application-less                               | LP-FX16D10-000C |
| FX16 Master Controller, 4 relays + 5 triacs, application-less, N2Open card pre-assembled    | LP-FX16D11-000C |
| FX16 Master Controller, 4 relays + 5 triacs, application-less, LonWorks® card pre-assembled | LP-FX16D12-000C |
| FX16 Master Controller, 4 relays + 5 triacs, application-less, RS-232 card pre-assembled    | LP-FX16D13-000C |

| Communication Card           | Ordering Codes |
|------------------------------|----------------|
| N2Open communication card    | LP-NET151-010C |
| LonWorks® communication card | LP-NET152-010C |
| RS232 communication card     | LP-NET163-000C |

| Accessories                                                                                       | Ordering Codes |
|---------------------------------------------------------------------------------------------------|----------------|
| Link cable for the connection of the FX16 Master Controller to the MUI / LUI display - 3m (10ft). | LP-KIT007-000C |
| Link cable FX16 Master Controller - STD modem - DB9, 1.5m (5ft)                                   | LP-KIT007-001C |
| Link cable FX16 Master Controller - GSM modem - DB15, 1.5m (5ft)                                  | LP-KIT007-002C |
| NULL MODEM link cable - RS232, 3m (10ft)                                                          | LP-KIT007-013C |
| NULL MODEM link cable - RS232, 15m (49ft)                                                         | LP-KIT007-014C |
| Kit of female screw connectors                                                                    | LP-KIT015-000C |
| Kit of female cage clamp connectors.                                                              | LP-KIT015-001C |
| MODEM GSM 900/1800 FastTrack                                                                      | LP-KIT090-000C |
| GSM modem plug-in antenna                                                                         | LP-KIT090-001C |
| GSM modem magnetic mount antenna - 2,5m (9ft) cable                                               | LP-KIT090-003C |
| GSM modem panel mount antenna - 5m (16ft)                                                         | LP-KIT090-004C |
| GSM modem power adapter, 230Vac/12Vdc, wall plug                                                  | LP-KIT090-005C |
| FX Programming Key                                                                                | LP-KIT100-000C |

| Demos                                                                                 | Ordering Codes  |
|---------------------------------------------------------------------------------------|-----------------|
| DEMO FX16 Master Controller, 9 relays, application-less, N2Open card pre-assembled    | LP-FX16DEM-001C |
| DEMO FX16 Master Controller, 9 relays, application-less, LonWorks® card pre-assembled | LP-FX16DEM-002C |
| DEMO FX16 Master Controller, 9 relays, application-less, RS-232 card pre-assembled    | LP-FX16DEM-003C |

| User Interface Displays                                                                              | Ordering Codes        |
|------------------------------------------------------------------------------------------------------|-----------------------|
| Large User Interface V.2, (4x20 character) LCD backlit display (LUI with standard JCI front plate).  | <b>LP-DIS65P10-0C</b> |
| Medium User Interface V.2, (4x20 character) LCD backlit display, <b>panel mount</b> version.         | <b>LP-DIS60P10-0C</b> |
| Medium User Interface V.2, (4x20 character) LCD backlit display, <b>wall mount</b> isolated version. | <b>LP-DIS60P11-0C</b> |

| Expansion Modules                                        | Ordering Codes      |
|----------------------------------------------------------|---------------------|
| Extension module                                         | <b>XT-9100-8304</b> |
| Expansion board: 6AI, 2AO                                | <b>XP-9102-8304</b> |
| Expansion board: 8DO (triacs)                            | <b>XP-9103-8304</b> |
| Expansion board: 4DI, 4DO (triacs)                       | <b>XP-9104-8304</b> |
| Expansion board: 8DI                                     | <b>XP-9105-8304</b> |
| Expansion board: 4DO (relays) 230VAC (Europe only)       | <b>XP-9106-8304</b> |
| Expansion board: 4DO (relays) 24VAC (North America only) | <b>XP-9107-8304</b> |

| Software                                                               | Ordering Codes        |
|------------------------------------------------------------------------|-----------------------|
| FX TOOLS 2 Suite CD-Rom (FX Builder, FX CommPro, FX Loader)            | <b>LP-FXTOOLS2</b>    |
| FX TOOLS Express Suite CD-Rom (FX Builder Express, FX CommPro Express) | <b>LP-FXTOOLS-EXP</b> |

# Technical Specifications

## I/O Details

| Terminals                             |                                   | Type                                         | Remark/Application                                                                                                                                                                          |
|---------------------------------------|-----------------------------------|----------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Analog Input (AI)</b>              |                                   |                                              |                                                                                                                                                                                             |
| TB1                                   | AI1, AI2, AI3, AI4, AI5, AI6      | See table below<br>16 bit resolution         | Freely software configurable.<br>Application: temperature, humidity, pressure, etc.                                                                                                         |
| 3, 8                                  | EXT-VDC                           | +16 V, 80 mA                                 | 0-10 V Sensors<br><b>or</b><br>max no. 4 0/4 - 20 mA Sensors                                                                                                                                |
| 13                                    | AVPS / EXT-VDC                    | AVPS = +5 V, 20 mA<br>EXT-VDC = +16 V, 80 mA | To power directly from the FX16 ratiometric sensors, with AVPS<br><b>or</b><br>0-10 V, 0/4 - 20 mA Sensors with EXT-VDC.<br>The selection between AVPS and EXT-VDC is done through jumpers. |
| <b>List of available sensor input</b> |                                   |                                              |                                                                                                                                                                                             |
| Sensor Type                           | Linearization Range               |                                              | Accuracy @ 20°C ambient                                                                                                                                                                     |
| Ni1000 JCI                            | -45°C (-49°F) to 120 °C (248°F)   |                                              | +/- 0.5° C (32°F)                                                                                                                                                                           |
| Ni1000 JCI Extended                   | 20°C (68°F) to 287°C (548.6°F)    |                                              | +/- 0.5° C (32°F)                                                                                                                                                                           |
| Ni1000 Siemens                        | -50,00°C (-58°F) to 160°C (320°F) |                                              | +/- 0.5° C (32°F)                                                                                                                                                                           |
| Ni1000 DIN                            | -60,00°C (-76°F) to 180°C (356°F) |                                              | +/- 0.5° C (32°F)                                                                                                                                                                           |
| Pt1000                                | -50°C (-58°F) to 605°C (1121°F)   |                                              | +/- 0.6° C (32°F)                                                                                                                                                                           |
| A99                                   | -50°C (-58°F) to 110°C (230°F)    |                                              | +/- 0.5° C (32°F)                                                                                                                                                                           |
| NTC 2,2K                              | -40°C (-40°F) to 150°C (302°F)    |                                              | +/- 0.5° C (32°F)                                                                                                                                                                           |
| 0 to 5 VDC ratiometric                | 10 to 90% of supply voltage       |                                              | 0.3%                                                                                                                                                                                        |
| 0 to 10 VDC                           | 0 to 10 Volts                     |                                              | 0.3%                                                                                                                                                                                        |
| 0 to 20 mA                            | 0 to 20 mA                        |                                              | 0.3%                                                                                                                                                                                        |

| Digital Input (DI)    |                                              |                                                       |                                                                                                                                                                                                                                                                                                               |
|-----------------------|----------------------------------------------|-------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TB2                   | DI1, DI2, DI3,<br>DI4, DI5, DI6,<br>DI7, DI8 | Potential free contacts                               | In order to assure galvanic isolation a different 24 VAC power supply must be used to empower the digital inputs (through terminals 34, 35). Transition counter function maximum 1Hz. For quicker counter function use the XP-9105 module.                                                                    |
| Digital Output (DO)   |                                              |                                                       |                                                                                                                                                                                                                                                                                                               |
| TB3                   | DO1, DO2,<br>DO3                             | SPST 8(3)A power relays                               | Max switching power:<br>2000VA, 240W, 0.5HP, 250VAC<br><br>UL/CUR rating: 8A 250VAC<br>8A 30VDC<br><br>VDE rating: 8A 250VAC<br><br>Expected electrical life min. operations:<br>1 x 10 <sup>5</sup> operations (360 ops x hour)<br><br>Dielectric strength:<br>coil-contacts 4000 Vrms                       |
| TB4                   | DO4, DO5                                     | SPST 5(3)A power relays<br>or<br>0,5A / 24 VAC triacs | Max switching power:<br>1250VA, 150W<br>Rating (resistive): 10A 125VAC<br>5A 250VAC<br>5A 30VDC<br><br>Expected electrical life (min operations):<br>10A 125Vac 5x10 <sup>4</sup><br>5A 250VAC 5x10 <sup>4</sup><br>5A 30VDC 10 <sup>5</sup><br><br>Dielectric strength:<br>coil-contacts 4000 Vrms for 1 min |
| TB5                   | DO6, DO7,<br>DO8                             | SPST 5(3)A power relays<br>or<br>0,5A / 24 VAC triacs |                                                                                                                                                                                                                                                                                                               |
| TB6                   | DO9                                          | SPDT NC 8(3)A 250V relay                              | Same as TB3 relays<br>Fail relay for enhanced security. The relay will return to its NC position not only at power fail but also in case the microprocessor should fail: watch-dog, brown-out, etc.                                                                                                           |
| Analogue Outputs (AO) |                                              |                                                       |                                                                                                                                                                                                                                                                                                               |
| TB7                   | AO1, AO2                                     | 0 ÷ 10 VDC (max 1.5 mA)                               | Used to drive analog actuators, frequency drives. 16 bit resolution.                                                                                                                                                                                                                                          |
| TB8                   | AO3, AO4                                     | 0 ÷ 10 VDC (max 1.5 mA)                               | Used to drive analog actuators, frequency drives. 16 bit resolution.                                                                                                                                                                                                                                          |
| 79, 80                | AO V~ Hot<br>AO V~ Com                       | 24VAC                                                 | In order to assure galvanic isolation a different 24 VAC power supply must be used to empower the analog outputs.                                                                                                                                                                                             |

## FX16 Master Controller

|                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product</b>                                                                                                                                                                                                                                                                      | FX16 Master Controller                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Power Supply Requirements</b>                                                                                                                                                                                                                                                    | 24 VAC $\pm 15\%$ , 50/60 Hz - Class 2 Power Supply                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Power Consumption</b>                                                                                                                                                                                                                                                            | 15 VA at max load                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Internal Fuse</b>                                                                                                                                                                                                                                                                | 2 A, 250 V                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Protection Class</b>                                                                                                                                                                                                                                                             | IP 20                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Ambient Operating Conditions</b>                                                                                                                                                                                                                                                 | -20°C to +50°C 10 to 95% rH (non condensing)                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Ambient Storage Conditions</b>                                                                                                                                                                                                                                                   | -20°C to +70°C 10 to 95% rH (non condensing)                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Dimensions (H x W x D)</b>                                                                                                                                                                                                                                                       | 142 x 215 x 49                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Weight (with package)</b>                                                                                                                                                                                                                                                        | 0,74 Kg                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Connection terminals for signals and power supply</b>                                                                                                                                                                                                                            | Screw terminals for max 1 x 1.5 mm <sup>2</sup> wires<br>or<br>Cage clamp connectors 1 x 1.5 mm <sup>2</sup> wires<br><b>To be ordered separately</b>                                                                                                                                                                                                                                                                                                                        |
| <b>LonWorks® / N2Open bus connection terminals</b>                                                                                                                                                                                                                                  | Screw terminals, cable size 0.05 to 1.5 mm <sup>2</sup> , AWG30 to AWG14<br>Belden cable, 2-core twisted pair with shield                                                                                                                                                                                                                                                                                                                                                    |
| <b>Connection terminals for extension bus and remote display</b>                                                                                                                                                                                                                    | Screw terminals, cable size 0.05 to 1.5 mm <sup>2</sup> , AWG30 to AWG14                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Single cable lengths</b><br><i>Digital Inputs DI1 - DI8</i><br><i>Analog Inputs AI1 - AI6</i><br><i>Triac outputs (when present)</i><br><i>Analog Outputs AO1 - AO4</i><br><i>Remote Display</i><br><br><i>Extension Modules Bus</i><br><b>Display and Extensions cable type</b> | Max. 100m (328,1 ft) with diameters $\geq 0.6$ mm (0.02 in)<br>Max. 100m (328,1 ft) with diameters $\geq 0.6$ mm (0.02 in)<br>Max. 100m (328,1 ft) where $A \geq 1.5$ mm <sup>2</sup> (0.002 in <sup>2</sup> )<br>Max. 100m (328,1 ft) where $A \geq 1.5$ mm <sup>2</sup> (0.002 in <sup>2</sup> )<br>Max. 3m (9.8 ft) if display is powered by controller. Max. 1km (1.9 mi) if display independently powered<br>Max. 1km (0.6 mi)<br>Belden 4-core, twisted pair, shielded |
|  <b>Compliance</b>                                                                                                                                                                               | 89/336 EEC directive: EN 50081-1 (EN 61000-6-3),<br>EN 50082-1 (EN 61000-6-1)<br>73/23 EEC directive: EN 60730                                                                                                                                                                                                                                                                                                                                                               |
| <b>UL compliance</b>                                                                                                                                                                                                                                                                | UL873                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

## N2Open Bus Characteristics

|                             |                                                                                                       |
|-----------------------------|-------------------------------------------------------------------------------------------------------|
| <b>RS485 line</b>           | maximum length without repeater: 1200m (4000ft), AWG26 twisted pair with shield.                      |
| <b>Devices</b>              | maximum of 32 per 1200m (4000ft) bus segment.                                                         |
| <b>RS485/232 Converter</b>  | IU-9100 if third party converter is used then make sure it supports automatic DSC (Data Send Control) |
| <b>Electrical Isolation</b> | 1500 V                                                                                                |

### LonWorks® Network Characteristics

|                                               |                                                                                                                                                             |                      |
|-----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
| <b>LonWorks® network and Line Terminators</b> | Daisy chained Bus Topology: two terminators of 100 Ohm required, one at each end of the bus.<br>Free (star) topology: single terminator of 50 Ohm required. |                      |
| <b>Nodes</b>                                  | 64 (if repeaters are not used),<br>FTT-10 nodes only.                                                                                                       |                      |
| <b>Cable type:</b>                            | <b>Length with FTT-10 devices</b>                                                                                                                           |                      |
|                                               | <b>Bus topology</b>                                                                                                                                         | <b>Free topology</b> |
| <b>Belden 85102</b>                           | 2700m (1.7mi)                                                                                                                                               | 500m (0.3mi)         |
| <b>Belden 8471</b>                            | 2700m (1.7mi)                                                                                                                                               | 500m (0.3mi)         |
| <b>Level IV 22 AWG</b>                        | 1400m (0.9mi)                                                                                                                                               | 400m (0.3mi)         |

### GSM modem

|                                                    |                                                                | GSM 900     |      |         | GSM 1800/1900 |      |         |
|----------------------------------------------------|----------------------------------------------------------------|-------------|------|---------|---------------|------|---------|
| Voltage Range                                      |                                                                | 5 to 32 VDC |      |         |               |      |         |
| Power Supply @25°C                                 |                                                                | Min         | Typ  | Max     | Min           | Typ  | Max     |
| Input Supply voltage                               |                                                                | 5           | 13.2 | 32      | 5             | 13.2 | 32      |
| Input peak supply current<br>(in communication)    | @5 V                                                           |             |      | 1.8A    |               |      | 1.1 A   |
|                                                    | @13.2 V                                                        |             |      | 0.7A    |               |      | 0.4 A   |
|                                                    | @32 V                                                          |             |      | 0.4A    |               |      | 0.2 A   |
| Input average supply current<br>(in communication) | @5 V                                                           |             |      | 330 mA  |               |      | 220 mA  |
|                                                    | @13.2 V                                                        |             |      | 130 mA  |               |      | 95 mA   |
|                                                    | @32 V                                                          |             |      | 65 mA   |               |      | 50 mA   |
| Input average supply current<br>(in idle mode)     | @5 V                                                           |             |      | 31.4 mA |               |      | 31.4 mA |
|                                                    | @13.2 V                                                        |             |      | 13.2 mA |               |      | 13.2 mA |
|                                                    | @32 V                                                          |             |      | 5.6 mA  |               |      | 5.6 mA  |
| Ambient Operating Conditions                       | -20°C (-4°F) to +55°C (131°F)                                  |             |      |         |               |      |         |
| Ambient Storage Conditions                         | -25°C (-13°F) to +70°C (158°F)                                 |             |      |         |               |      |         |
| Housing Material                                   | Aluminium profiled                                             |             |      |         |               |      |         |
| Volume                                             | 12.2cm <sup>3</sup> (0.7in <sup>3</sup> )                      |             |      |         |               |      |         |
| Weight                                             | < 130g (0.3lb)                                                 |             |      |         |               |      |         |
| Dimensions                                         | 98mm (3.9in) x 54mm (2.1in) x25mm (1in) (excluding connectors) |             |      |         |               |      |         |
| Overall dimensions                                 | 110mm (4.3in) x 54mm (2.1in) x 25mm (1in)                      |             |      |         |               |      |         |

### Programming Key

|                                 |                                                                                                                                      |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| <b>Power Supply</b>             | Directly powered from the Display Bus port of the FX15 Classic or from an AC/DC adapter 230V to 12 VAC ÷ 15 VDC min 2 VA             |
| <b>Memory type and size</b>     | Flash memory 1 Mbytes                                                                                                                |
| <b>Connection to controller</b> | Via RS485, not isolated, 10 cm cable provided with the key                                                                           |
| <b>Enclosure IP class</b>       | IP40                                                                                                                                 |
| <b>Ambient Limits</b>           | Operating: 0°C (32°F) – 40°C (104°F), 10-95% rH (not condensing)<br>Storage: -20°C (-4°F) – 70°C (158°F), 10-95% rH (not condensing) |
| <b>Agency Listing</b>           | 89/336 EEC directive: EN 50081-1 (EN 61000-6-3),<br>EN 50082-1 (EN 61000-6-1)                                                        |

The performance specifications are nominal and conform to acceptable industry standards. For application at conditions beyond these specifications, consult the local Johnson Controls office. Johnson Controls, Inc. shall not be liable for damages resulting from misapplication or misuse of its products.

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